

ENDOTRACHEAL TUBE STABILIZING DEVICES

BACKGROUND OF THE INVENTION

A currently used method of stabilizing endotracheal (E.T.) tubes is the popular method of taping the tube to the patient's mouth with surgical adhesive tape. However, this method has many problems, among them:

(1) Taping requires special skill and care, and if it is executed incorrectly the tube can still move in and out of the patient's mouth enough to cause significant irritation of the trachea.

(2) Saliva collects on the tape, and the tape in turn loses its adhesive efficacy, presenting the possibility of tube migration or accidental extubation. This problem also promotes biological contamination.

(3) Periodic replacement of the adhesive tape (due to problem No. 2 above) causes irritation of the patient's skin, especially in those patients requiring long term intubation. Long term intubation is not uncommon in neonatal and pediatric intensive care units.

(4) Any slight adjustments to the tube's position require removal of the tape and then retaping.

(5) Access to the mouth for suctioning etc. is made difficult by the presence of the tape.

There have been many attempts to provide stabilization for endotracheal tubes. Often the prior devices fail to address the problems associated with the taping method in a way that is suitable for neonatal and pediatric applications. That is why the taping method is still so widely used. Some devices, such as those shown in U.S. Pat. Nos. 4,191,180, 4,331,143 and 4,537,192, employ straps which pass behind the head and/or neck. While the use of straps provides more rigid tube support, straps are undesirable on infants whose heads are growing rapidly, especially when long term intubation is involved. Also, the straps can become entangled in the patient's bedsheets. Other devices, such as those shown in U.S. Pat. Nos. 3,993,081 and 3,713,448, are overly complicated to apply, especially when exact positioning of the tube within the trachea is critical, as is the case with small babies. Still other devices, such as what is shown in U.S. Pat. No. 4,329,984, are no better than the taping method, in that they still require taping in the area of the mouth, resulting in restricted access to the mouth and the attendant problems with saliva. Some proposed solutions (patents 4,331,143 and 4,537,192) cover vital areas of the patient's face such as the nose, mouth, and eyes, restricting access. The devices described in patents 4,331,143 and 4,537,192 do not address the means of attachment of the tube to the stabilization device in a credible manner. Mere "frictional restraint" is not a sufficiently reliable means of holding endotracheal tubes in the clinical setting.

SUMMARY OF THE INVENTION

The present invention solves the aforementioned problems associated with the prior art by providing endotracheal tube supports that are effective, easy to install and easy to adjust. The frames disclosed herein are provided with a unique attachment means which distributes the gripping force applied to the endotracheal tube so as to provide adequate support and ease of adjustment simultaneously.

The frames are preferably made of bendable material, such as wire or plastic, which allows the physician to

make adjustments in the shape of the frame to accommodate variations in patient size and head shapes.

In one embodiment of the invention, the frame is made of wire and is shaped to include three attachment points which actually correspond to the three corners of a triangularly shaped member. The three corners are rounded and conform to the shape of an infant's head by having one corner attached to the forehead, this corner corresponding to an apex of the triangle, and the other two corners being attachable to the zygoma region, these two corners corresponding to the base of the triangle. The wire is shaped to define a nose piece so that opposite ends of the wire terminate at the nose piece.

The frame is taped to three stomahesive patches. "Stomahesive" is a trademark of Squibb and consists of a thin wafer of cellulose material having an adhesive surface and a peel-off wax paper covering for the adhesive which is removed prior to use. One patch is placed over each zygoma and a third on the forehead. After placement of the corners of the frame over the stomahesive patches, tape is placed over the stomahesive patch in order to bind the corners to the stomahesive patch. In this embodiment, the endotracheal tube itself is secured to the frame by a single piece of tape wrapped two or three times around a nose piece extending upwardly from the frame in the region of the mouth and nose. This tape should be as water repellent as possible so that secretions do not loosen it from the frame.

In order to install the device, observations must be made as to the shape and size of the patient's head. Based on these observations, a properly sized frame can be adjusted by making bends where necessary in order to derive an optimal shape. The adjustments should leave the frame balanced such that all three corners rest flatly against the patient's face, without having any other part of the frame touch the face.

Once the frame is fitted to the individual requirements of the patient, taping of the frame to the head can proceed.

First, three stomahesive patches are cut, with preferably two smaller ovals provided for the zygoma and a more narrow oval for the forehead. Use of benzoin on the skin to apply the patches is preferable.

After intubation, the frame is applied to the stomahesive patches and held in place with tape. Once all three corners are secure, the endotracheal tube is taped to the frame's nose piece. The nose piece can be radially outwardly extending support which provides rigidity of the tube over a substantial length.

The frame itself is substantially planar except for the zygoma corners which bend slightly to conform to the shape of the patient's head. However, the frame remains close to the patient's face to minimize risk of bumping.

Part of the invention lies in the ease with which the device can be attached. The attachment means includes tape which attaches the frame to "off-the-shelf" stomahesive pads. This substantially reduces the cost and increases the ease with which the device can be attached. The stomahesive pads, as is generally known by those of ordinary skill in the art, have adhesive between the face and the pad.

The use of tape to secure the tube to the frame is likewise effective and inexpensive. Other types of attachment means may be used, such as latches that use channels and spring biasing means to hold the tube within the channel. Spring loaded latches may be used, such as those used in broom holders or test tube holders.